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REDUCTION OF ARSENIC WASTES IN THE SEMICONDUCTOR INDUSTRY

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FOREWORD

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E. Timothy Oppelt, Director
National Risk Management Research Laboratory

ABSTRACT

The research described in this report was aimed at initiating and developing processes and process modifications that could be incorporated into semiconductor manufacturing operations to accomplish pollution prevention, especially to accomplish significant reduction in the quantity of arsenic waste generated in that industry. The effort resulted in the development of processes for the recovery of both gallium and arsenic from gallium arsenide semiconductor crystal manufacturing. Recovery of materials from both solid and aqueous waste streams was achieved and the solids recovery process was demonstrated at an operating semiconductor manufacturing plant. The processes developed herein are applicable to other types of III-V semiconductor manufacturing, including indium phosphide, gallium phosphide and indium arsenide manufacturing.

The two processes developed include processes for recovery of materials from both solid and aqueous waste streams. The solid waste recovery process a thermal process for separation of gallium and arsenic from each other and from process contaminants with subsequent thermal refining of the captured gallium and arsenic. The aqueous waste recovery process incorporates sequential precipitation of the arsenic and gallium to allow for their recovery and reuse. This report was submitted in partial fulfillment of the requirements of Cooperative Agreement No. CR 821808-01

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